

Peritoneal Dialysis Indications and Limitations

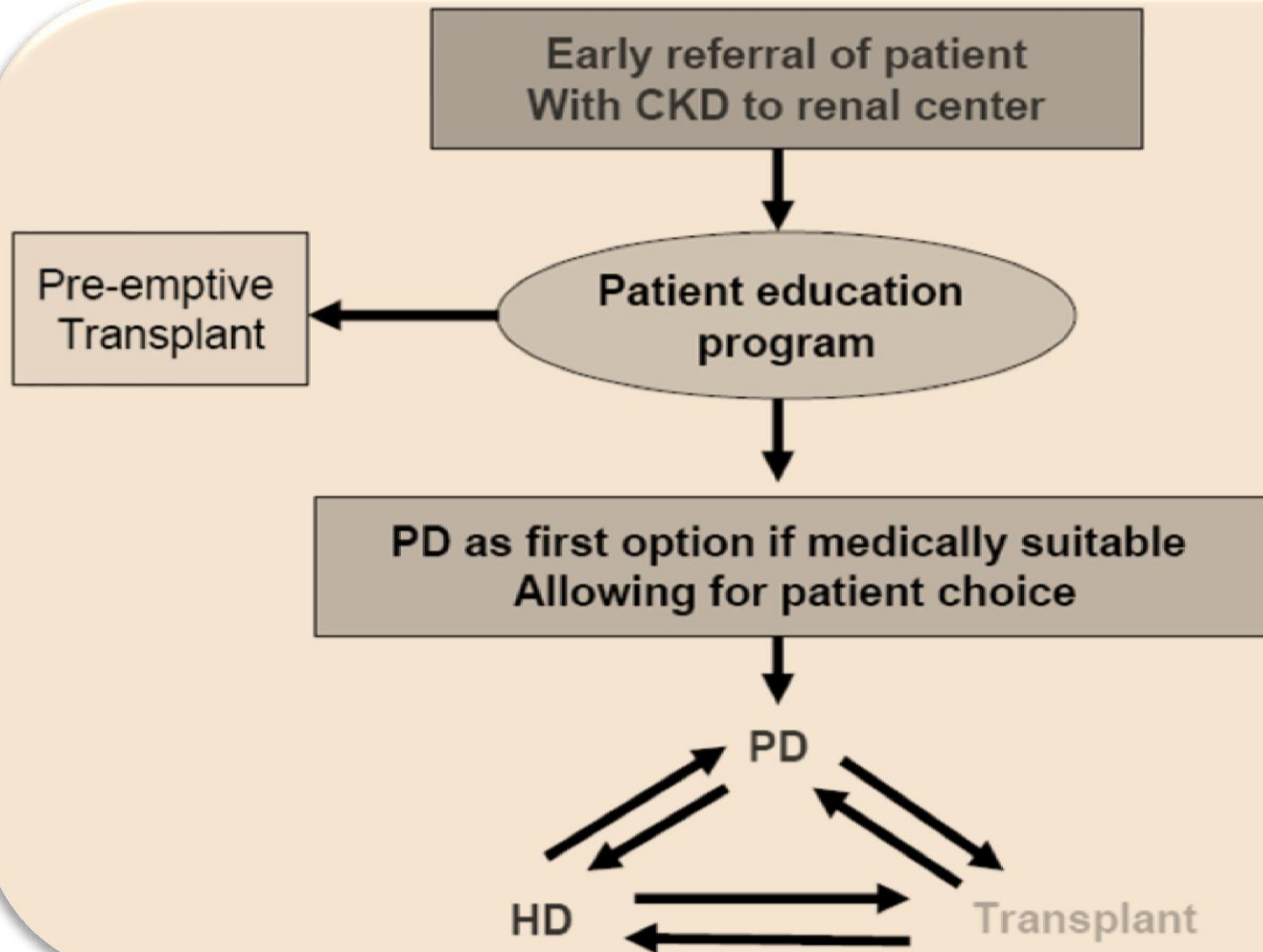
By

Mostafa Abd_Elsalam, MD

Classification of CKD according to GFR

Stage	GFR	Description
1	>90	Kidney damage with normal or increased GFR
2	60-89	Kidney damage with mild GFR fall
3	30-59	Moderate fall in GFR
4	15-29	Severe fall in GFR
5	<15 or RRT	Established renal failure

Managing New Patient with ESRD



Prof. MacLeod:

“Patients whose kidney fail require life-saving treatment with dialysis or with a kidney transplant.

Although dialysis is now very advanced, allowing more patients to be treated successfully, it is also very expensive.

It is essential, therefore, to ensure that resources are used as effectively as possible.”^[1]

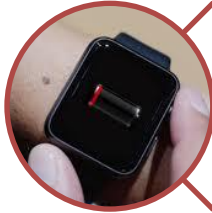
[1] Khan I., MacLeod A. Towards cost-effective dialysis therapy in Europe: the need for a multidisciplinary approach. *Nephrol Dial Transplant* 1997; 12: p. 2483

1st steps towards peritoneal dialysis.



The word peritoneum refers to the Greek word “**peritononion**” and means to stretch. Ancient Egypt were probably the first people to get a look at the peritoneum

Why to start with PD ?



Preservation of RRF



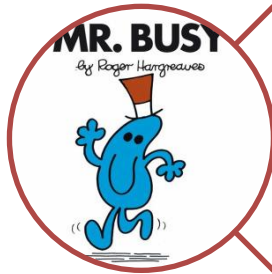
Higher Hb concentration



Less risk of acquiring blood borne infections e.g. HCV



Better quality of life



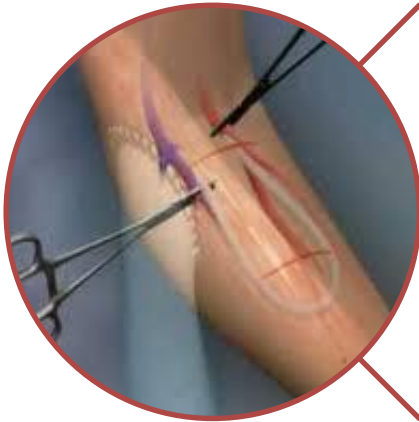
Travel , employment



It allows expansion with
limited resources



Lower staff / patient
ratio



saves vascular
access



preferred for
children (APD)

Things to Remember

ESRD is life-long ordeal

- Access problems
- Higher morbidity and mortality

Survival lines

- One PD membrane
- 4 sites for permanent vascular access
- Two iliac for transplantation

“The right modality at the right time.”

Peter Blake, MD, John Burkart, MD



“Complementary Not Competitive”

Coles 1998

PD versus HD

Which is best?

- PD may best be seen as a therapy for early years of dialysis with HD being used as a back up if or when PD fails
- This approach which has recently been called “integrated dialysis care” has economic as well as medical advantages

CAPD Advantages

- Medical
- Lifestyle
- Economic

Economic

- Paradoxically, however the difference is greater in poorer developing countries and least in wealthier countries .

LIFESTYLE

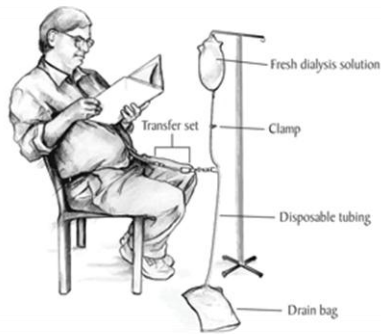
- Given free choice , because it involves less daytime procedures and so less disruptive .
- Exceptions are people who are nervous about machines or who have difficulty staying in bed .

Patient selection



Selecting RRT modalities is influenced by a number of **considerations** **such as**

- Patient Preference .
- Availability And Convenience.
- Underlying Medical Problems and Comorbid Conditions.
- Socioeconomic and Dialysis Center Factors.
- The Patient's Home Situation
- Medical staff Training.

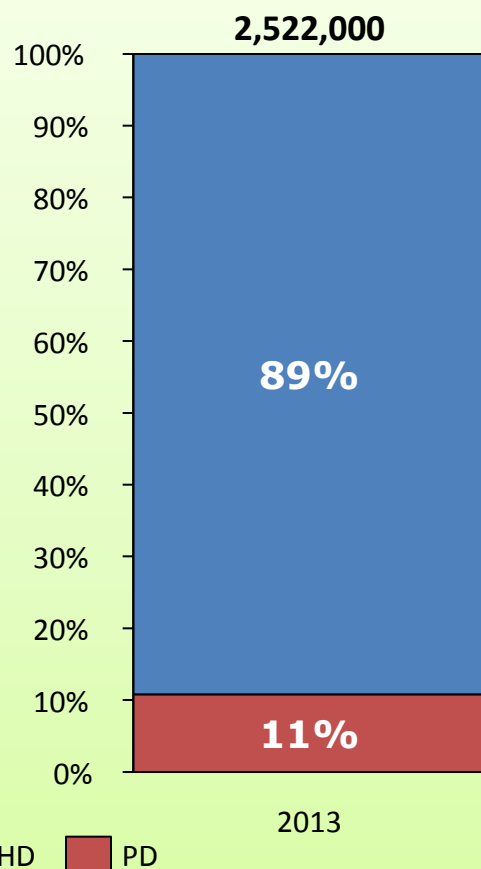


- Those wanting a lifestyle with more freedom and flexibility
- Those with diabetes, cardiovascular disease, or hypertension
- Patients who live a long way from their dialysis unit and /or who have had problems with hemodialysis
- Individuals whose peritoneal membrane can handle the daily needs of this option

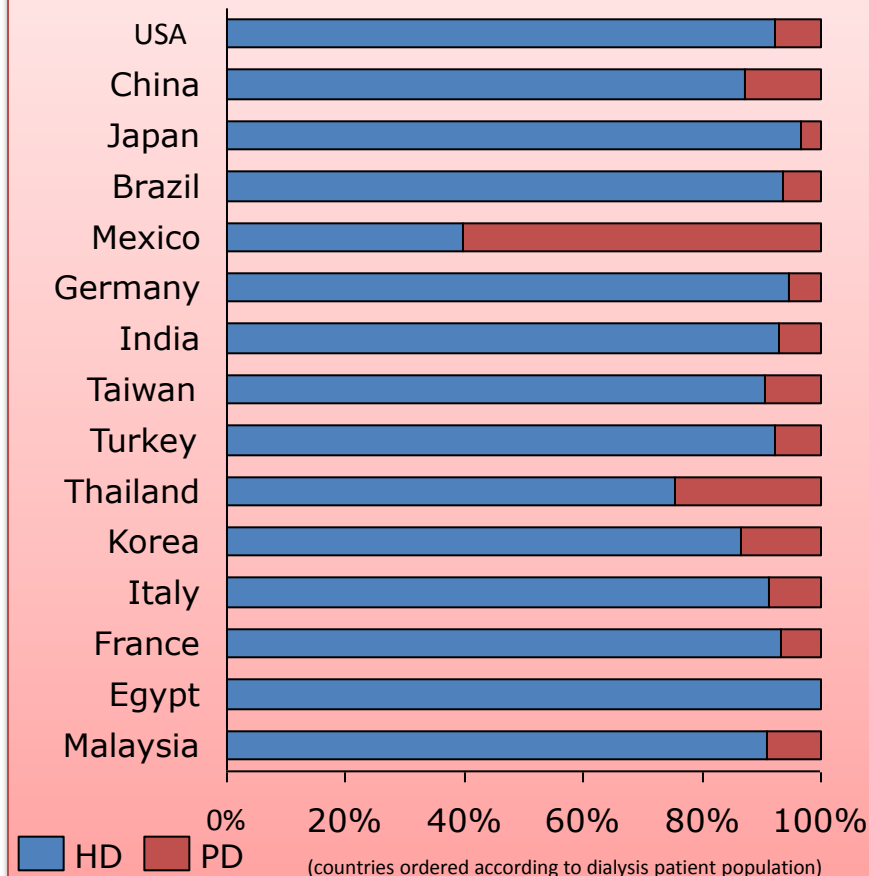
11% of all dialysis patients are treated with PD

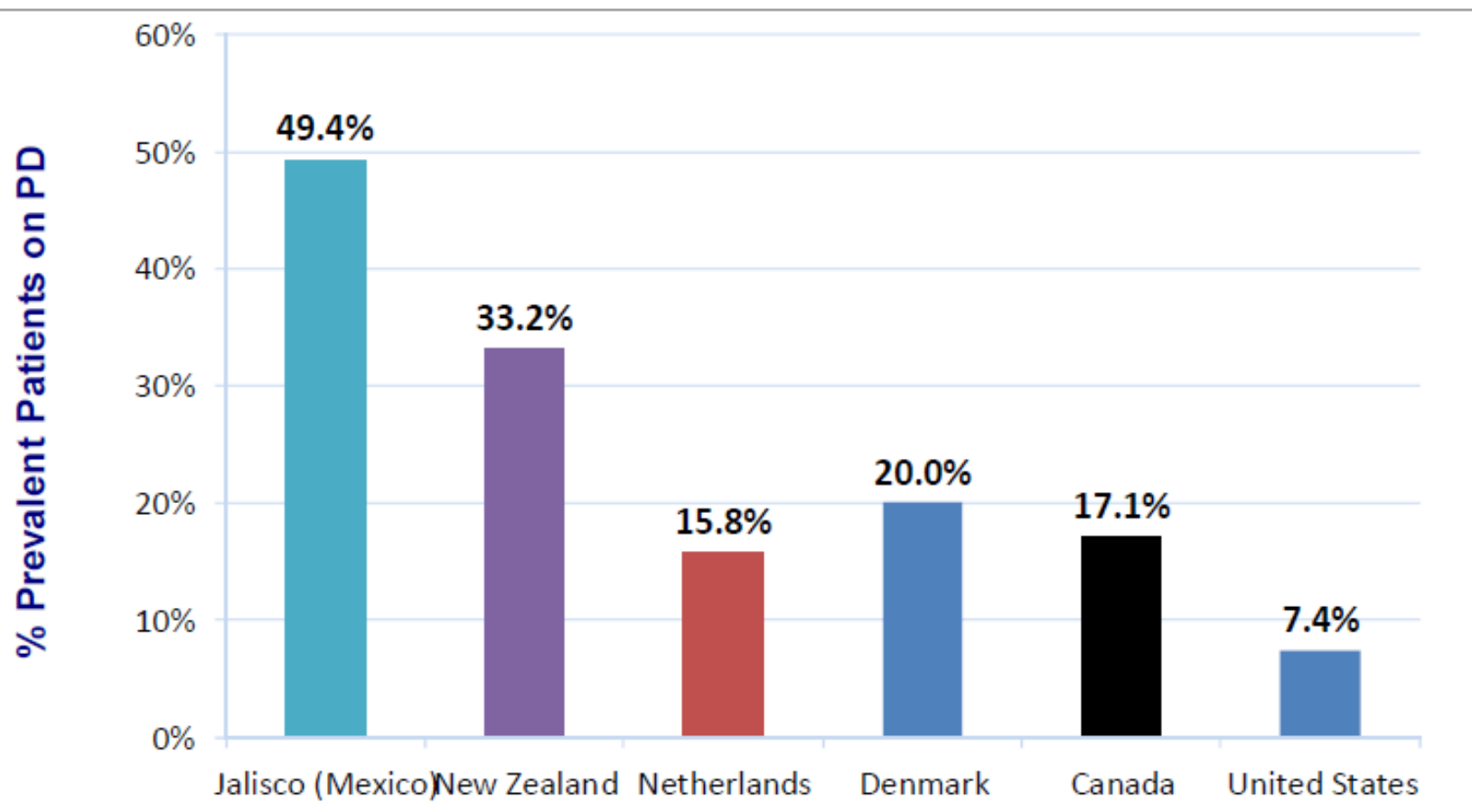
PD distribution differs significantly between countries

Global dialysis patients



HD – PD patient distribution





ONLINE FIRST

Similar Outcomes With Hemodialysis and Peritoneal Dialysis in Patients With End-Stage Renal Disease

Rajnish Mehrotra, MD; Yi-Wen Chiu, MD; Kamyar Kalantar-Zadeh, MD; Joanne Bargman, MD; Edward Vonesh, PhD

Background: The annual payer costs for patients treated with peritoneal dialysis (PD) are lower than with hemodialysis (HD), but in 2007, only 7% of dialysis patients in the United States were treated with PD. Since 1996, there has been no change in the first-year mortality of HD patients, but both short- and long-term outcomes of PD patients have improved.

Methods: Data from the US Renal Data System were examined for secular trends in survival among patients treated with HD and PD on day 90 of end-stage renal disease (HD, 620 020 patients; PD, 64 406 patients) in three 3-year cohorts (1996-1998, 1999-2001, and 2002-2004) for up to 5 years of follow-up using a nonproportional hazards marginal structural model with inverse probability of treatment and censoring weighting.

Results: There was a progressive attenuation in the higher risk for death seen in patients treated with PD in earlier cohorts; for the 2002-2004 cohort, there was no significant difference in the risk of death for HD and PD patients through 5 years of follow-up. The median life expectancy of HD and PD patients was 38.4 and 36.6 months, respectively. Analyses in 8 subgroups based on age (<65 and ≥ 65 years), diabetic status, and baseline comorbidity (none and ≥ 1) showed greater improvement in survival among patients treated with PD relative to HD at all follow-up periods.

Conclusion: In the most recent cohorts, patients who began treatment with HD or PD have similar outcomes.

Arch Intern Med. Published online September 27, 2010.
doi:10.1001/archinternmed.2010.352

Hemodialysis Vascular Access Modifies the Association between Dialysis Modality and Survival

Jeffrey Perl,^{*†} Ron Wald,^{*†} Philip McFarlane,^{*†} Joanne M. Bargman,^{†‡} Edward Vonesh,[§] Yingbo Na,^{||} S. Vanita Jassal,^{†‡} and Louise Moist[¶]

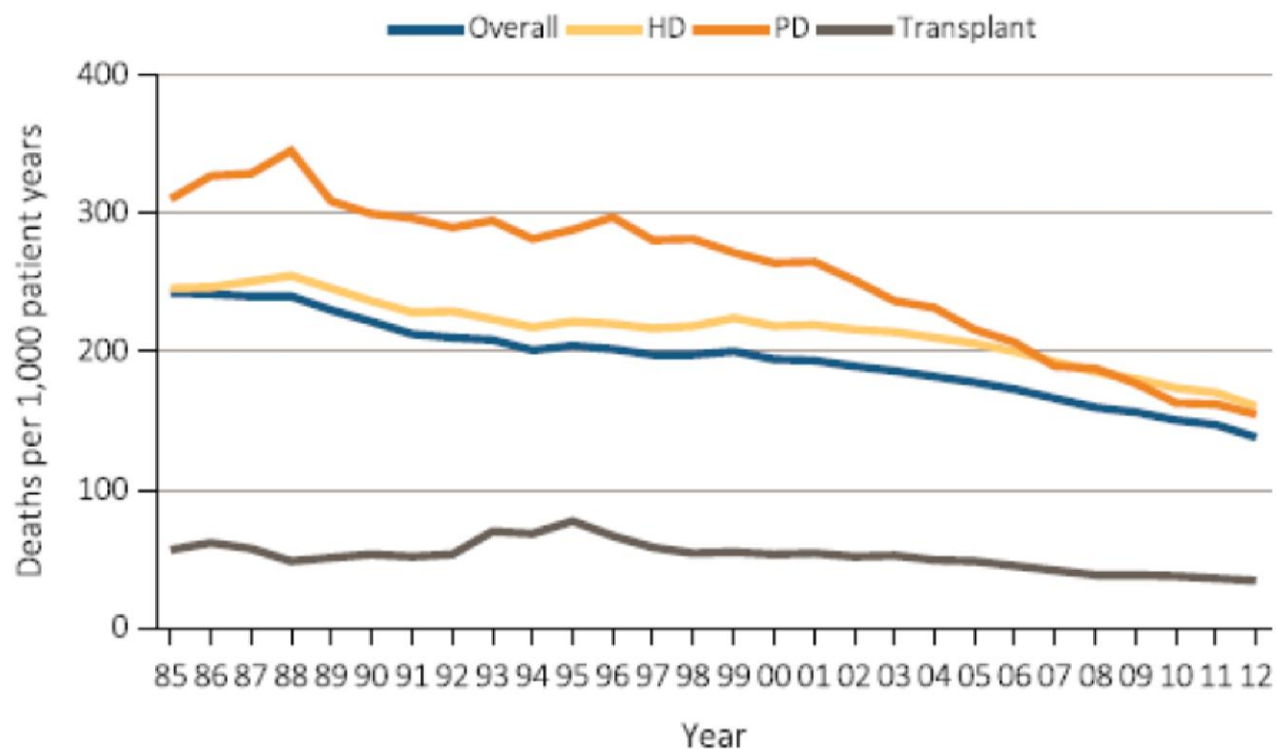
^{*}Division of Nephrology, St. Michael's Hospital and the Keenan Research Centre in the Li Ka Shing Knowledge Institute, St. Michael's Hospital, Toronto, Ontario, Canada; [†]Department of Medicine, Division of Nephrology, University of Toronto, Ontario, Canada; [‡]Department of Medicine, University Health Network, Toronto, Ontario, Canada; [§]Department of Preventive Medicine, Northwestern University, Feinberg School of Medicine, Chicago, Illinois; ^{||}Canadian Institute of Health Information and the Canadian Organ Replacement Register, Toronto, Ontario, Canada; and [¶]Division of Nephrology, London Health Sciences Centre, Victoria Hospital University of Western Ontario, London, Ontario, Canada

ABSTRACT

Several comparisons of peritoneal dialysis (PD) and hemodialysis (HD) in incident patients with ESRD demonstrate superior survival in PD-treated patients within the first 1 to 2 years. These survival differences may be due to higher HD-related mortality as a result of high rates of incident central venous catheter (CVC) use or due to an initial survival advantage conferred by PD. We compared the survival of incident PD patients with those who initiated HD with a CVC (HD-CVC) or with a functional arteriovenous fistula or arteriovenous graft (HD-AVF/AVG). We used multivariable piece-wise exponential nonproportional and proportional hazards models to evaluate early (1 year) mortality as well as overall mortality

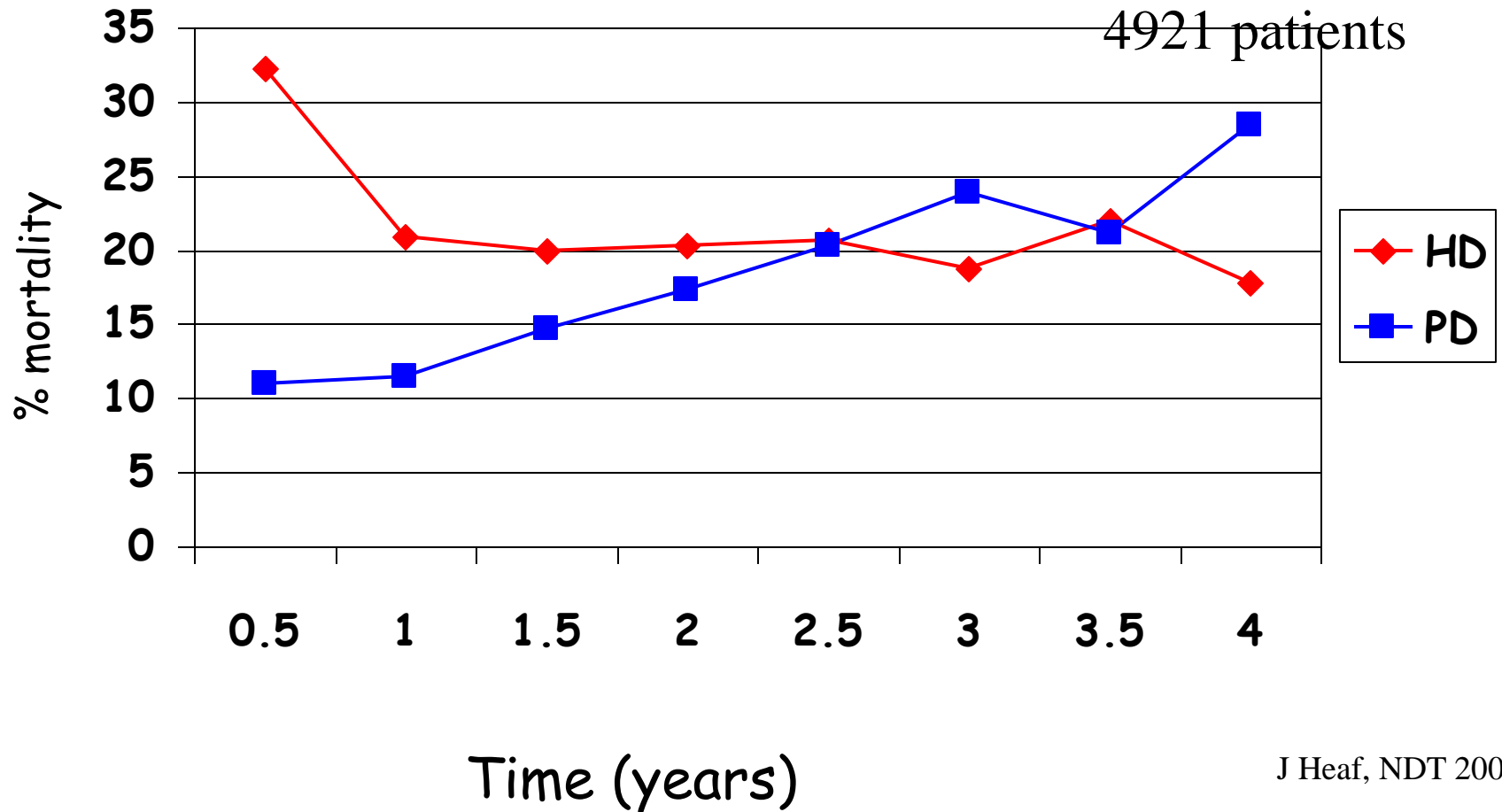
Perl J, Wald R, McFarlane P, et al. Hemodialysis vascular access modifies the association between dialysis modality and survival. *J Am Soc Nephrol* 2011;22:1113-1121

vol 2 Figure 5.1 Adjusted all-cause mortality rates, overall and by modality



Data Source: Reference Tables H.2, H.8, H.9, and H.10, and special analyses, USRDS ESRD Database. Adjusted for age, sex, race, and primary diagnosis. Ref: 2011 patients. Abbreviations: HD, hemodialysis; PD, peritoneal dialysis.

PD Patients Have an Initial Survival Advantage Relative to HD. Danish Registry 2001



Peritoneal Dialysis *First*: PD Should Be Considered for Dialysis Initiation

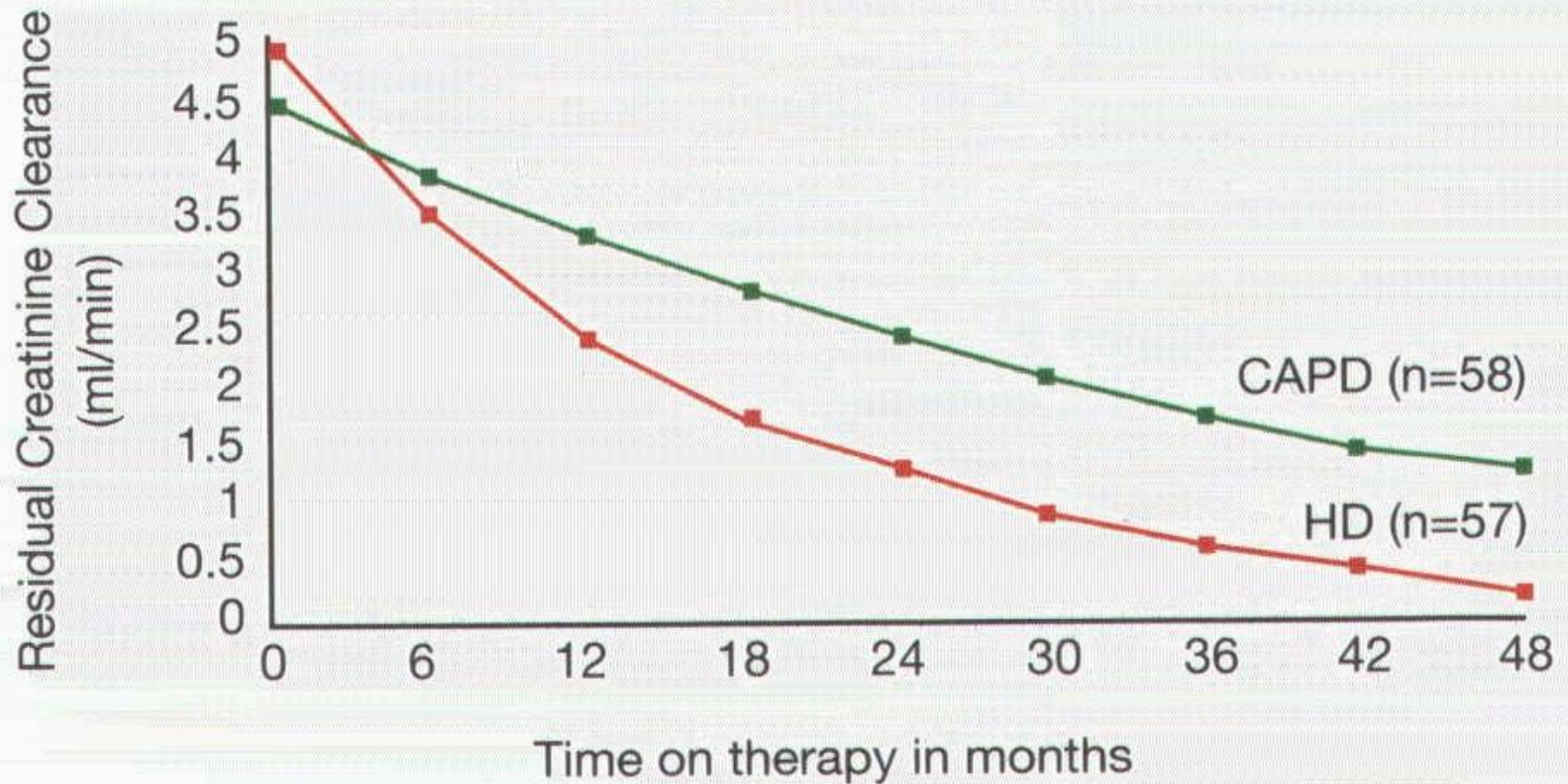
Nephrology Times *May 2009*

While the issue of survival differences between the two modalities remains unsettled, it is clear that utilizing PD at the initiation of dialysis will slow the decline in residual renal function and may provide a survival advantage within the first years of dialysis.

J. Kevin Tucker, MD, is Medical Director of the Peritoneal Dialysis Program at Brigham and Women's Hospital



Better maintenance of residual renal function



What Are the Benefits of Preserving RRF?

Provides endocrine functions

Contributes to total solute clearance
(1 ml/min CrCl = 10 liter CrCl/week)

**Reduces
Mortality**

**Improves
QOL**

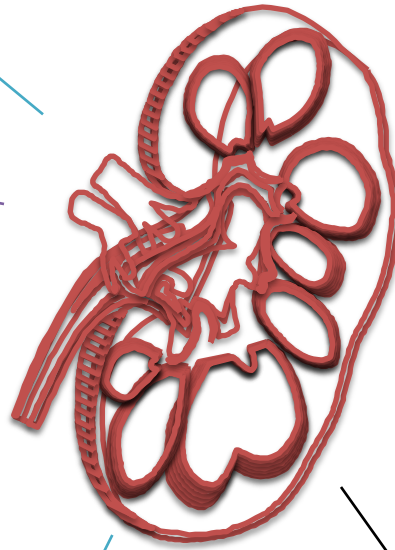
**Increases total
Na removal**

**Improves
nutritional status**

**Allows for more
liberal diet and
fluid intake**

**Improves
 β 2-microglobulin
and middle
molecule clearance**

**Facilitates
volume control**





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Health-Related Quality of Life of Patients Receiving Hemodialysis and Peritoneal Dialysis in São Paulo, Brazil: A Longitudinal Study

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¹Universidade Federal de São Carlos, São Carlos, Brazil; ²Baxter Healthcare Corp., McGaw Park, IL, USA, at the time of study; ³Nephrology Division, Universidade Federal de São Paulo, São Paulo, Brazil; ⁴São Paulo Centre for Health Economics, Universidade Federal de São Paulo, São Paulo, Brazil

ABSTRACT

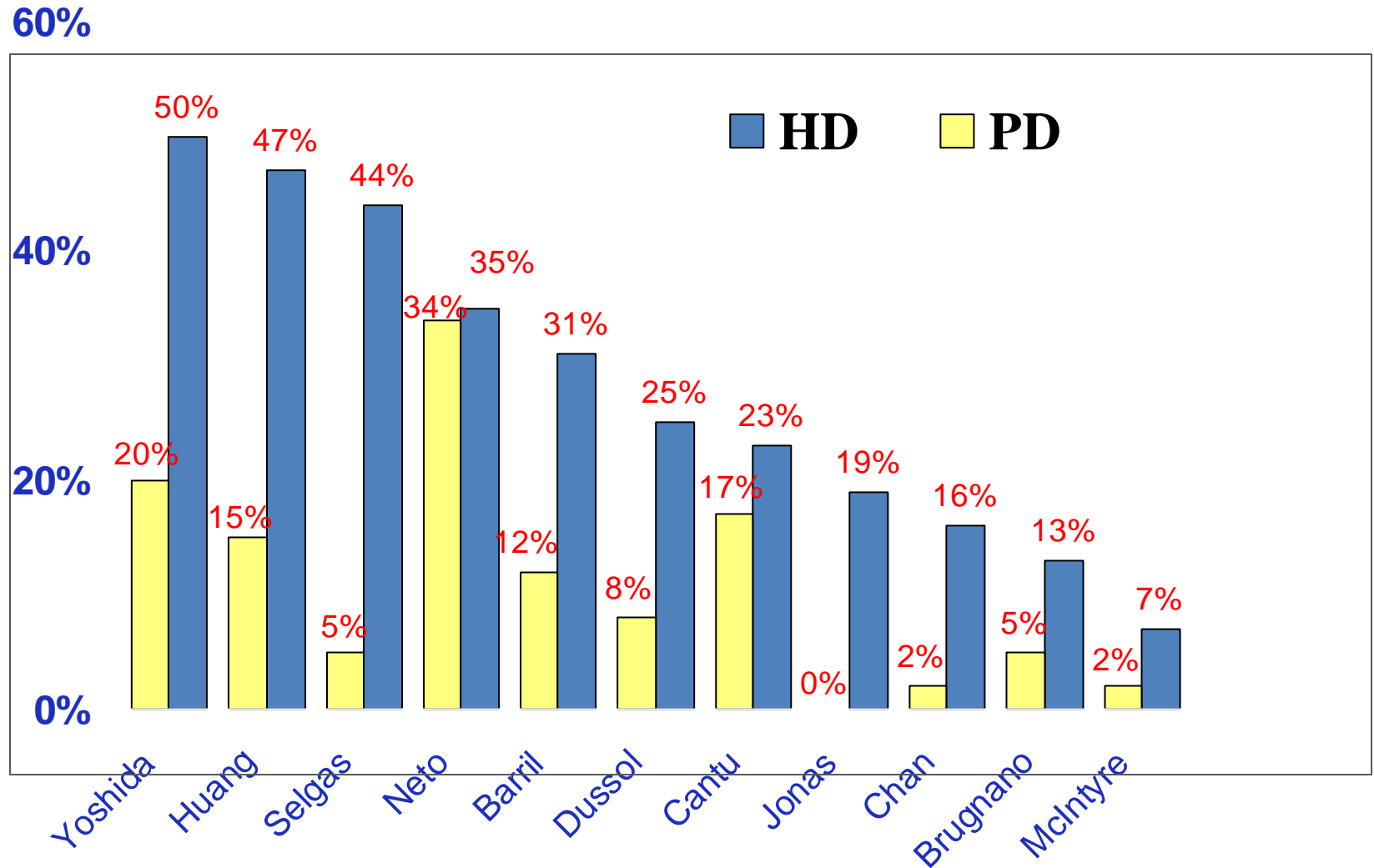
Objectives: The aim of this study was to evaluate quality of life in patients undergoing hemodialysis (HD) or peritoneal dialysis (PD) in São Paulo, Brazil. **Methods:** Inclusion criteria for this is a 1-year prospective study included being 18 years of age or older and clinically stable receiving chronic dialysis. Quality of life was measured using the SF-12 and the Kidney Disease Quality of Life questionnaires at baseline, 6 months, and 12 months. Patients who completed the surveys for all three periods were evaluated. Differences in quality of life scores were measured using univariate and multivariate regression analyses. **Results:** One hundred eighty-nine of 249 (76%) HD patients and 161 of 228 (71%) PD patients completed all three surveys. The PD group was older and a larger number had diabetes. PD patients consistently had higher scores than HD patients at all three measurement periods for patient satisfaction ($P = 0.002$, $P = 0.005$, and $P = 0.005$, respectively), encouragement/support from staff ($P = 0.003$, $P = 0.017$, and $P = 0.029$,

respectively), and burden of kidney disease ($P = 0.003$, $P = 0.017$, and $P = 0.057$, respectively). The HD group had a greater percent of patients who clinically improved from baseline to 12 months compared to PD patients for sleep quality, social support, encouragement/support from staff, and overall health. Scores for other dimensions of the Kidney Disease Quality of Life and SF-12 questionnaires were not significantly different between the PD and HD groups. **Conclusions:** The results provide evidence that PD and HD patients have equivalent health-related quality of life in several domains, although the former performed better in some quality of life domains despite being older and having more comorbidities.

Keywords: chronic disease, hemodialysis, peritoneal dialysis, quality of life.

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Prevalence of anti-HCV Among Patients on Dialysis by Modality



Most Patients Are Medically Eligible for PD

Netherlands 83% and U.S.A 76%

The prevalence of medical contraindications to PD (23% to 24%) is similar to the 17% to 21% reported ... from other parts of the world

Jager KJ, Korevaar JC, Dekker FW et al. The effect of contraindications and patient preference on dialysis modality selection in ESRD patients in the Netherlands. *Am J Kidney Dis.* 2004;43:891-899.

Mehrotra R, Marsh D, Vonesh E, et al. Patient education and access of ESRD patients to renal replacement therapies beyond in-center hemodialysis.. *Kidney Int.* 2005;68:378-390

Logistics of PD versus HD

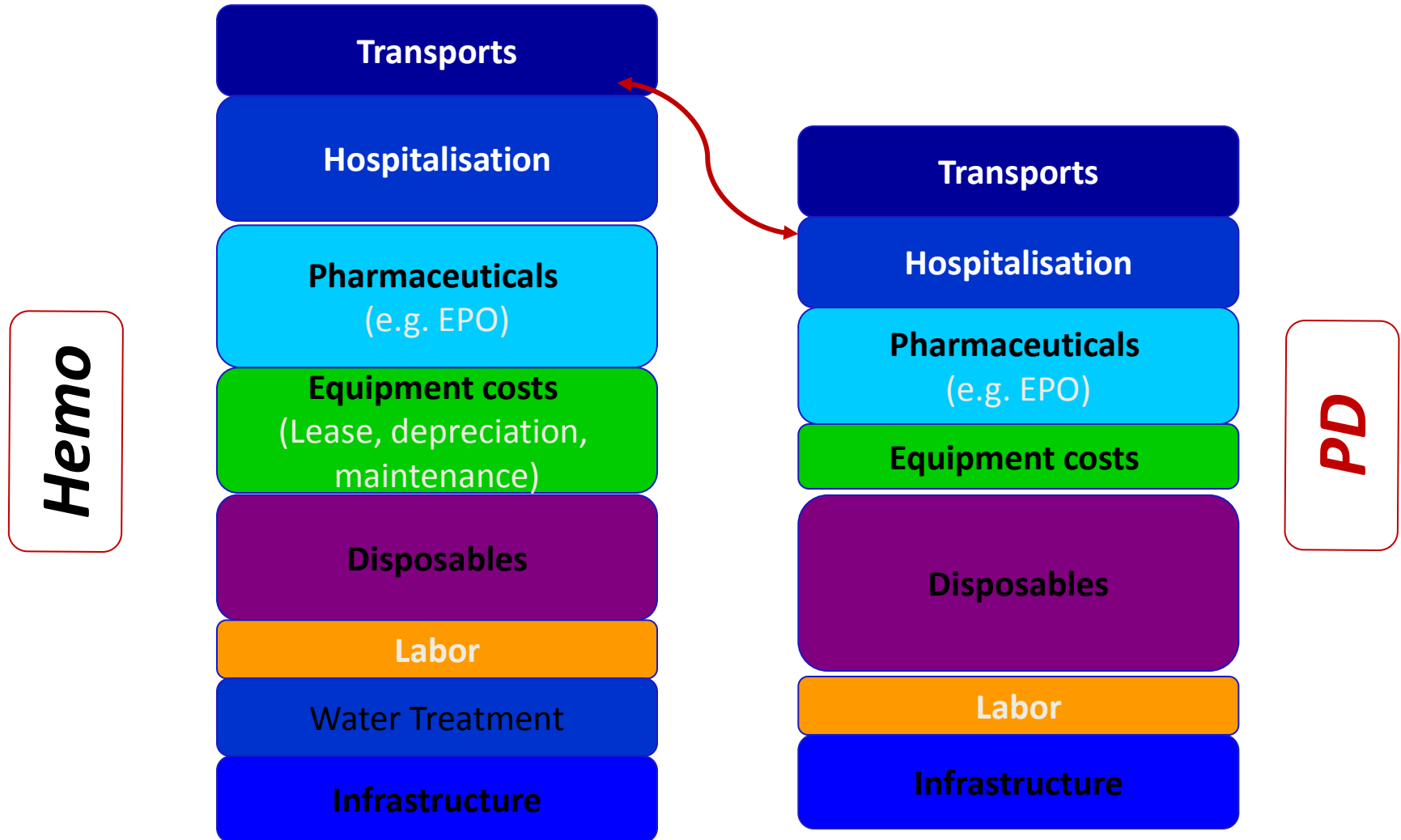
Logistics of PD versus HD

40 Nurses per **100** HD-patients.

4 Nurses in the Out-patient Clinic per **100** PD-patients.



Schematic RRT Cost Comparison Available Modalities



Modality Cost Comparison in KSA

Modality cost comparison - Hemo / PD cost to the health budget / Kingdom of Saudi Arabia

HEMO

	cost per patient / year US \$
Labor costs (salary, fully loaded)	6'500
Hardware (depreciated over 5 years)	2'440
consumables (HD equipment related)	4'992
Other expenses	3'920
(Lab and X-ray, Meals, Rent, complication management, access costs, etc.)	1'250
Expenses beared within different budgets (water treatment costs, hospital/shared service charges etc.)	
Total costs (excl. Pharam)	19'102
<u>Pharmaceutical costs</u>	
EPO costs	}
HepC treatment costs (on the bases of all Hemo pts dialysed)	
I.V. iron costs (pending)	
vitamine costs (pending)	
other pharmaceuticals (pending)	
	3'725
Total costs	22'827

PD

	cost per patient / year US \$
Labor costs (salary, fully loaded)	2'560
Hardware (depreciated over 5 years)	0
consumables (PD solutions)	14'667
Other expenses	400
(Lab and X-ray, Meals, Rent, complication management, access costs, etc.)	
Expenses beared within different budgets	225
(water treatment costs, hospital/shared service charges etc.)	
PD specific expenses	100
Total costs (excl. Pharma)	17'952
<u>Pharmaceutical costs</u>	
EPO costs	}
HepC treatment costs	
I.V. iron costs (pending)	
vitamine costs (pending)	
other pharmaceuticals (pending)	
	2'568
Total costs	20'520

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NDT
Nephrology Dialysis Transplantation

Cost of peritoneal dialysis and haemodialysis across the world

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⁴Department of Nephrology, Dialysis and Transplantation, San Bortolo Hospital, Vicenza, Italy

Africa

Country	Year	No. Studies	Final HD/PD cost ratio
Nigeria	2011	1	0.70
Senegal	2010	1	1.38
South Africa	2010	1	0.58
Sudan	2010	1	0.89
Kenya	2010	1	1.33
Egypt	2010	1	0.22

Europe

Country	Year	No. of studies	Final HD/PD cost ratio
Spain	2011	2	1.40
Austria	2011	1	1.68
France	2011, 2007	5	1.51
Belgium	2010	1	1.25
Finland	2009	2	1.38
Romania	2009	1	1.45
UK	2008	8	1.94

Asia and Middle East

Country	Year	No. of studies	Final HD/PD cost ratio
India	2013, 2012	2	1.08
Iran	2010	1	1.08
China	2009	1	1.16
Thailand	2009, 2007	2	1.10
Singapore	2009	1	1.38
Pakistan	2008	1	0.81

Latin America

Country	Year	No. of studies	Final HD/PD cost ratio
Brazil	2012, 2010	2	0.93
Argentina	2011	1	1.00
Chile	2009, 2007	2	1.03
Mexico	2009	2	1.53
Uruguay	2009	1	0.81
Colombia	2009	1	1.00

For Peritoneal Dialysis

PROS

- Lower cost than HD (in most countries)
- Pts more satisfied with overall care compared to HD
- Steady state treatment. Better tolerated hemodynamically
- Needleless
 - Preservation of vascular sites for future HD
 - Lower risk of blood-borne infections (hepatitis, ect.)
 - Alleviates anxiety for needle sticks
- Better preservation of RRF
- Fewer diet and fluid restrictions
- Less EPO use /no heparin
- Freedom to work, to go to school ect.

CONS

- Continuous therapy. No days off
- Body image concerns
- High technique failure rates compared to HD
- Space needed for monthly supplies of dialysis equipment and solutions
- Non compliance may lead to complications
 - Infections/uremia/ technique failure

A great man once said,
*“Everything is possible.
The impossible just
takes longer...”*